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ABSTRACT

This booklet is designed to aid teachers who are using the Maryland Plan, a program of industrial arts designed to be useful with junior high students who have diverse interests, capabilities, and aspirations. The main purpose of the guide is to aid in program development and specification of observable, measurable behaviors for accountable instruction. Contents include a definition of industrial arts, and discussion of goals and purposes, the program, objectives, student behavior, and measurable outcomes. The major portion of the guide consists of observable student behaviors for each of three units: The Anthropological Unit, The Group Project Approach, and Line Production Approach. Within each unit-behaviors are listed under each of five sub-headings: Understanding the nature of industry and technology, self exploration, intellectual growth, skill development, and interpreting the changing nature of industry and technology. An appendix contains a Maryland Plan development model and lists resource materials and films on the Maryland Plan. (Author/HD)

INDUSTRIAL ARTS IN THE JUNIOR HIGH SCHOOL:

PURPOSES — OBJECTIVES — OBSERVABLE BEHAVIORS

A Guide for Teachers of the
Maryland Plan for Industrial Arts

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Introduction

Each year educators are faced with an increased emphasis on accountability in the public schools. It is important that teachers formulate course content with specific observable student behaviors. Three purposes for defining student behaviors in developing a program are:

1. Student behaviors are the goals toward which the program is aimed.
2. Student behaviors facilitate the selection and organization of content.
3. When stated in terms of observable behaviors the outcomes of curriculum are capable of being evaluated.

The emphasis must be on students and what the educational experience can do for each individual. The students education is preparation for life in an age that will face the benefits and problems of technology. The educational community must accept the challenge of a dynamic, multi-sensory educational experience for the development of knowledge, skill and self awareness for students to survive and become useful members of society.

The statement of objectives and instruction evolving from the formulation of a broad scope of observable student behaviors is necessary in order for education to be accountable to students.

The Maryland Plan for industrial arts in the junior high school has from its beginning been a program built upon a knowledge of youth and an analysis of behavioral tasks for youth.

The Maryland Plan; Grades 7, 8 and 9

The Maryland Plan for the junior high school is a program of industrial arts structured around a unique educational experience for students with diverse interests, capabilities, and aspirations. The Maryland Plan finds its utilization through a definition of industrial arts; goals and purposes, program, objectives, student behaviors and measurable outcomes. The relationship of the six aspects of curriculum mentioned above are schematically interpreted in Figure I.

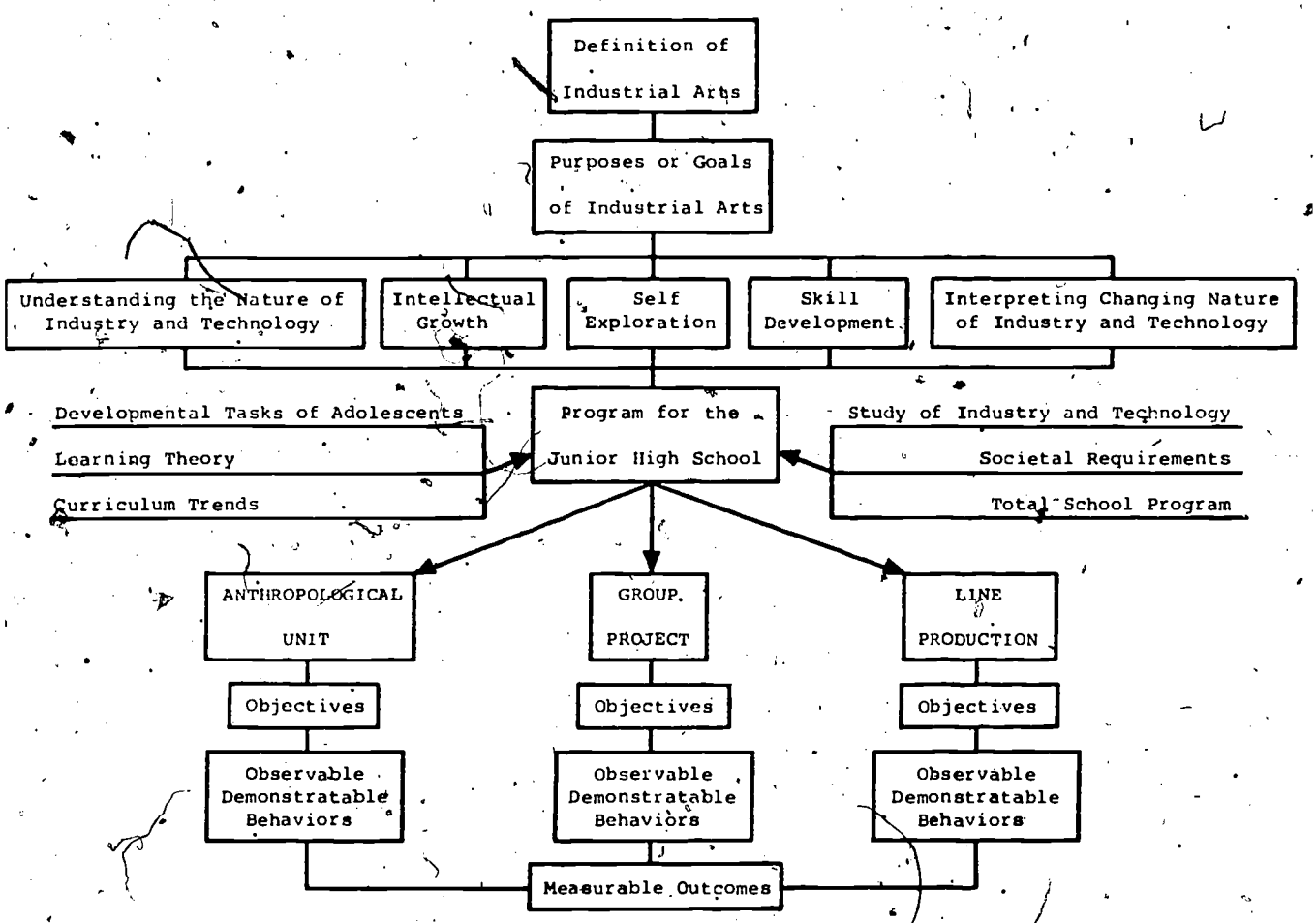


Figure I

DEFINING OBSERVABLE BEHAVIORS FOR THE MARYLAND PLAN

The student is involved in his learning, discovering, experiencing, constructing, interacting, contributing, and growing. The teacher is managing, facilitating, stimulating, reinforcing, guiding and evaluating. The elements and content structure of the junior high program are graphically represented in Figure II.

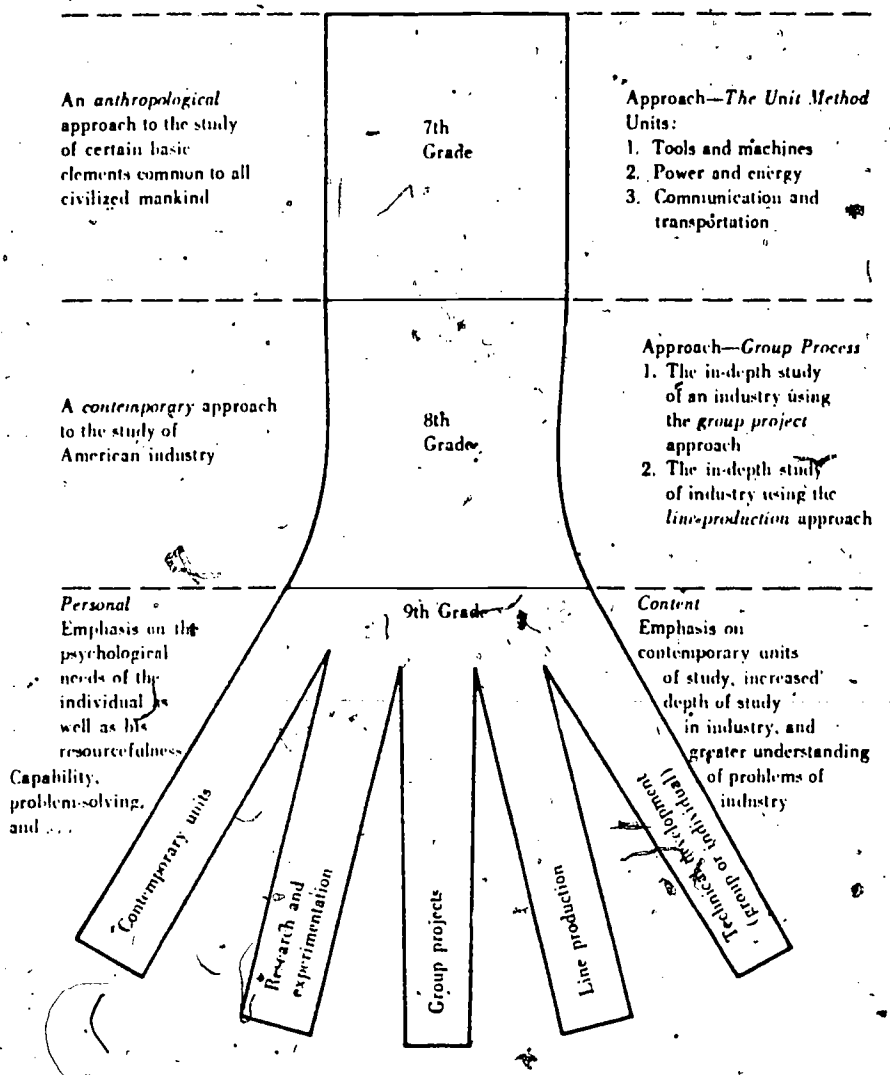


DIAGRAM OF THE JUNIOR HIGH PROGRAM

Figure II

(From Maley, 1973, page 19)

SEVENTH GRADE PROGRAM

The Anthropological Unit. The anthropological unit employs an approach to instruction aimed at reaching a variety of student interests and abilities. The historical study of technology is the basis for the unit of study. The unit can be divided into three elements of technology:

...The development of tools and machines and their contribution to the growth of civilization.

...The development of transportation and/or communication and their contribution to the growth of civilization.

...The development of power and energy and their contribution to the growth of civilization.

The class decides on a unit topic to study. Each student selects a sub-topic under the unit topic. The student pursues information on the sub-topic of his/her choice. A model, display and report are then prepared on the sub-topic. Participation in seminars giving progress reports, making final presentations, and sharing information with other students in the class allows for the students involvement in the learning process.

EIGHTH GRADE PROGRAM

The eighth grade program is a study of contemporary industry through the use of group processes--the group project and/or line-production.

The Group Project. The group project is an in-depth study of a single major raw materials processing industry such as cement, steel, glass, plastics, etc. The students organize, plan, and produce a single project (a model or panel display) depicting the production process or products of the selected industry.

The students form a company in which each student assumes a management position. Each student interviews his/her counterpart in industry and plays the role within the student company. In addition to playing a management role the student is employed as a worker in construction of the student project. Seminars and meetings are held where company business is conducted and individual students relate their roles to the group. Educational activities are essential to the process and may include field trips, films, guest speakers and demonstrations.

The process aims at students' involvement, interaction, leadership, followership, and problem-solving for his/her social adjustment and responsibility.

Line Production. The line production experience explores contemporary volume producing industries such as the automobile industry. The approach deals with the industrial enterprise and its concepts of product development, tooling-up, assembly lines, interchangeable parts, industrial relations, financing and marketing.

The class selects a product to be manufactured. The students choose and assume management roles to run the company

and study the structure and organization of modern volume production. A second role is assumed by each student when he/she becomes a worker on the production line. The students design the product, raise the capital for production, manage the operation, tool-up for production, train laborers, produce the product, advertise, and market the product. In many cases stock markets are formed, unions are organized, workers are fired and every attempt is made to explore the many facets of modern volume producing industries. The seminar is again utilized for company meetings, staff meetings, defining roles, education, presentations by class members and guests, and analyzing the outcome of the process.

The line production experience is an opportunity for students to develop an understanding of the materials, products, processes, organization and problems of volume producing industries. Equally important is the opportunity to develop skills in communicating, leading, following, problem-solving, working with others, planning, and creating.

NINTH GRADE PROGRAM

The ninth grade program employs the group processes, the unit approach, the opportunity for individual development, and research and experimentation to branch out and widen the opportunities to explore the industrial and technological nature of modern society. The program takes into account the varied interests, abilities, and needs of students.

Research and experimentation is a unique opportunity for the above average student while it is not restricted to this group. Contemporary units examine the nature of modern industry and technology through the selection of a unit topic and the identification of pertinent sub-topics. Group projects undertake the organization of a management team to construct a display and study technological advances or a specific contemporary industry. Line production builds on the eighth grade manufacturing experience to produce a more sophisticated product and expand the company organization and student roles.

Research and Experimentation. Research and experimentation is the uniquely new approach employed in the ninth grade. This is an experience in problem-solving, researching, testing, experimenting, analyzing and reporting. The student identifies a problem to solve. The problem is stated. Information is collected through research and investigation. Experiments are conducted which may necessitate the construction of apparatus. Data are collected. Findings are reported and presented to the class in the seminar. Throughout the process prime importance is placed on how the student arrives at his answers. Seminars are held on a regular basis for students to report progress, seek assistance, evaluate and share information with others.

Suggestions for Use of the Guide

This guide was developed to assist teachers utilizing the Maryland Plan. It is intended to aid in program development and specification of observable measurable behaviors for accountable instruction.

The processes of defining observable behaviors developed through several stages. First, the definition of industrial arts and the purposes of the Maryland Plan were set down. (Maley, 1973, p. 12) Secondly, the anthropological unit, group project, and line production constituted the program based on the above definition and purposes. Thirdly, general objectives were formulated. Fourthly, observable behaviors were listed under each objective.

General objectives are broad statements describing the goals of a unit of instruction. Observable behaviors are specific behavior statements associated with the general objectives. They are defined by actions of students in the learning process capable of being observed.

It is not expected that students will exhibit all behaviors nor is it possible that a teacher can observe every behavior. In the classroom it is necessary that the child have the opportunity to exhibit the behaviors while he/she is actively learning.

This guide is not complete for it is not exhaustive of all possible behaviors within the scope of the Maryland Plan.

It is not a substitute for teacher designed objectives and observable behaviors adapted to his/her unique program and instructional approach. This guide is intended to provide a basis from which the teacher can formulate general objectives and a list of observable behaviors for his/her teaching. In many cases behaviors in this guide are general and need to be more specific when applied to an instructional unit.

There are instances contained within this guide where general objectives and student behaviors are similar or the same for two or all three approaches. They are intended to be common. The Maryland Plan emphasizes the way people learn rather than only what they learn. For this reason there are behaviors that should be emphasized at every level in the learning process.

Objectives and observable behaviors for an instructional program should never be final or complete. Evaluation, revision, and assessment of instruction should be a continuous process in order to meet the needs of students.

For Additional Reference

Maley, Donald. The Maryland Plan. New York: Benziger Bruce & Glencoe, Inc., 1973.

Maley, Donald. "The Maryland Plan for Industrial Arts in the Junior High School and The Behavioral Task

Analysis Approach," A Presentation at the National Convention of the American Industrial Arts Association held at Las Vegas, Nevada, 1969.

Definition of Industrial Arts---

Industrial Arts as a curriculum area is defined as those phases of general education which deal with technology--its evolution, utilization, and significance--and with industry--its organization, materials, occupations, processes, and products--and with the problems and benefits resulting from the technological and industrial nature of society.

(Maley, 1973, page 12)

Purposes for Industrial Arts

1. To enable the student to interpret, to discuss, or to describe the organization, problems, products, processes and contributions of industry and technology.

2. To enable the student to use his mind, in order to develop his intellectual growth.

3. To enable the student to explore and to realize his potential as an individual.

4. To enable the student to develop skills and habits in the areas of problem-solving and social functioning, as well as in manual and mental manipulation.

5. To enable the student to describe and interpret the changing nature of industry and technology, and their impact on his goals.

(Maley, 1973, page 12)

GENERAL OBJECTIVES AND OBSERVABLE BEHAVIORS

THE ANTHROPOLOGICAL UNIT

I. UNDERSTANDING THE NATURE OF INDUSTRY AND TECHNOLOGY

A. GENERAL OBJECTIVE: The student develops an understanding of the beginnings of modern industry.

Observable Behaviors

The student--

...identifies an early development relative to a selected subtopic.

...outlines the history of a subtopic.

...compares industry--past and present.

...relates names, places and dates.

...relates problems encountered in the early development of industry and technology.

...discusses the early effects of industry on society.

...identifies the contributions made by man to the industrial growth of civilization.

...states reasons for the early development of his/her subtopic.

...identifies related technological developments in the period corresponding to the subtopic he/she chooses.

B. GENERAL OBJECTIVE: The student develops a knowledge of the contributions of industry and technology to the growth of civilization.

Observable Behaviors

The student--

...recognizes technological developments.

...lists the advantages and disadvantages of technological development.

...reports recent technological advancements.

...identifies the contributions of his subtopic to the growth of civilization.

...compares current technological advancements with those of the past.

...relates names, dates, places and events.

...answers questions about his subtopic accurately and intelligently.

...constructs a display depicting the contributions of his subtopic.

II. SELF EXPLORATION

A. GENERAL OBJECTIVE: The student develops an understanding of the varied occupations in the industrial world.

Observable Behaviors

The student--

...identifies occupations related to his/her chosen subtopic.

...identifies occupations and roles of persons encountered in the search for information.

...asks questions of other students relating to occupations.

...investigates the working conditions associated with occupations related to subtopic.

...identifies himself/herself with an occupation.

...relates classroom activities to the world of work.

...relates the occupations of early workers to the occupations of today.

B. GENERAL OBJECTIVE: The student develops his/her interests and capabilities.

Observable Behaviors

The student--

...suggests and speculates on subtopic possibilities.

...pursues a subtopic of interest.

...assesses his/her inadequacies.

...participates voluntarily in seminar discussions.

...prepares a report on his/her subtopic.

...constructs a project representing the subtopic.

...designs and develops a display for presenting his subtopic.

...reads and reports on articles pertaining to his/her subtopic.

...lists criteria for subtopic selection.

...improves upon and uses his/her unique talents whether they be verbal, manipulative, leadership, followership, or creative.

...explores his/her talents and interests in a meaningful and productive experience.

C. GENERAL OBJECTIVE: The student develops social and leadership capabilities.

Observable Behaviors

The student--

...organizes a seminar.

...leads a seminar.

...accepts criticism and suggestions.

...challenges other students appropriately.

...helps others clarify possibilities.

...leads a discussion.

...initiates questions voluntarily.

...works cooperatively with others.

...engages in new and involved peer relationships.

...recognizes or identifies the contributions made by other students.

...offers constructive suggestions.

...achieves success and accomplishment as a contributing member of the group.

III. INTELLECTUAL GROWTH

A. GENERAL OBJECTIVE: The student develops the capability to pursue independent study and utilize research procedures.

Observable Behaviors

The student--

...identifies sources for information.

...uses information in the solution of problems.

...incorporates research in the preparation of a report.

...aids other students in finding information.

...prepares a bibliography for inclusion in a report.

...accepts help and suggestions from other students.

...seeks suggestions from other students in solving problems.

...writes letters seeking information on his/her topic.

...visits resource persons, libraries, industries and museums to gather information.

...uses a telephone in the search for information.

...applies scientific principles.

...follows good research practices.

...uses cross references in his/her research.

...applies reasoning and arrives at conclusions based on gathered information.

...classifies information under appropriate headings.

B. GENERAL OBJECTIVE: The student develops creative abilities.

Observable Behaviors

The student--

...designs elements of the project.

...explores a range of possibilities.

...plans his/her approach to the problem of getting information.

...applies previous learning to new situations.

...produces bulletin board displays depicting design factors and operations.

...brainstorms possible subtopics.

...photographs class activities.

IV. SKILL DEVELOPMENT

A. GENERAL OBJECTIVE: The student develops an understanding in the use of tools, machines, and materials.

Observable Behaviors

The student--

...follows safe procedures in using tools and machines.

...selects material appropriate for construction.

...selects the best tools and machines for construction.

...selects finishing materials based on a knowledge of their qualities and uses.

...develops plans and drawings following acceptable drafting procedures.

...constructs model or display that depicts the topic he or she has chosen.

...uses tools, machines, and materials economically.

...makes appropriate adjustments in the tools he uses.

...identifies characteristics of quality workmanship.

...constructs one or more projects.

...constructs a scale model displaying craftsmanship and tool skills.

B. GENERAL OBJECTIVE: The student develops the ability to solve problems and make decisions.

Observable Behaviors

The student--

...selects a subtopic for study.

...discovers sources for information.

...designs a project representing a subtopic.

...selects materials appropriate for needed construction.

...identifies the specific aspect of the subtopic for study.

...participates as part of a group in decision making; i.e., selecting unit topic.

...determines the dimensions of the study.

...makes decisions with a minimum of teacher domination.

...formulates plans and procedures.

...draws conclusions.

...plans his/her approach to the problem of getting information.

...establishes standards for the student projects.

...draws conclusions.

...evaluates the work of others.

C. GENERAL OBJECTIVE: The student develops skill in the use of community resources in new and different ways as he/she researches a selected topic.

Observable Behaviors

The student--

...visits a community library.

...visits a museum.

...visits a government agency.

...visits a business or industry.

...seeks ideas on sources for information from classmates.

...suggests sources of information to others in class.

...interviews persons knowledgeable about a subtopic.

...contributes to a discussion on community resources.

...explores sources of materials.

...gathers and brings to class items, drawings, artifacts, pictures, etc.

D. GENERAL OBJECTIVE: The student learns to communicate and work effectively with others.

Observable Behaviors

The student--

...makes a seminar presentation on a subtopic.

...writes a paper reporting the research on a subtopic.

...writes letters seeking information on a topic.

...utilizes telephone as a media for obtaining needed information.

...volunteers information at seminars.

...conducts a personal interview.

...assists other students with problems.

...communicates graphically through displays, diagrams, drawings, etc.

...shows a film, filmstrip, or slides.

...uses visual aids in making presentations.

...draws up a seminar agenda.

...reproduces a seminar agenda.

...answers questions about his subtopic accurately.

...arranges information into useful patterns.

...challenges other students appropriately.

...inquires for specification.

...demonstrates projects or models.

V. INTERPRETING THE CHANGING NATURE OF INDUSTRY AND TECHNOLOGY

A. GENERAL OBJECTIVE: The student develops an understanding of industry's and technology's role in society.

Observable Behaviors

The student--

...evaluates the advantages of technology and industry to consumers.

...weighs the environmental consequences resulting from the industrial and technological nature of society.

...reports the contributions of the subtopic to society.

...constructs a project depicting the nature of technology in the development of society.

...identifies the contributions of his/her subtopic to the growth of civilization.

...conducts research on the chosen subtopic.

...inquires into the role of industry and technology in a culture.

...identifies possible applications of technology to the solution of problems.

THE GROUP PROJECT

I. UNDERSTANDING THE NATURE OF INDUSTRY AND TECHNOLOGY

A. GENERAL OBJECTIVE: The student develops understandings relative to the organization of the management personnel in industry.

Observable Behaviors

The student--

...discusses elements of the organization of industry.

...raises pertinent questions about the organization of industry.

...designs an effective organizational chart.

...constructs a line and staff organizational chart.

...modifies the organizational chart.

...develops a photographic display of the student personnel organization.

...corrects errors by others in the interpretation of industrial organization statements.

...draws relationships between various forms of industrial organization.

...identifies the different forms of industrial organizations.

...interprets a corporate organization.

...compares different forms of personnel or production charts.

...uses an organizational chart effectively.

...describes the organization of a selected industry.

...applies principles of good organization in leadership roles.

...solves problems related to the management of the student project.

...interacts with peers on a hierarchy of company positions from management to labor force.

...assumes one or more management roles.

...gathers information relative to the organization of the selected industry.

B. GENERAL OBJECTIVE: The student develops an understanding of industrial processes and their application in the production of goods and services.

Observable Behaviors

The student--

...visits industrial exhibits.

...interviews experts from industry and business.

...attends field trips to industrial plants.

...collects information by writing to industrial companies and organizations.

...develops criteria for industry selection.

...identifies various forms of industrial processes.

...inquires into the production processes of a major raw materials processing industry.

...discusses processes of a selected raw materials processing industry.

...presents and listens to oral reports pertaining to the selected industry.

...searches current literature and media for innovative processes of the selected industry.

...assumes one or more management roles.

...performs the role of production worker, and works on the construction of a group project.

...designs a group project which illustrates the major processes of a selected industry.

...constructs a group project which illustrates the processes of a selected industry.

C. GENERAL OBJECTIVE: The student develops an understanding of the benefits and problems which form the industrial and technical nature of contemporary society.

Observable Behaviors

The student--

...solves problems related to production, people, materials, etc.

...identifies problems which relate to the selected industry.

...inquires into possible solutions of the identified problems.

...listens to guest speakers.

...interviews experts in industry.

...identifies the by-products of a selected industry.

...participates in the educational program.

...researches possible solutions to technological problems related to the selected industry.

...constructs a group project which offers possible solutions to technological problems.

...explores possible solutions to selected technological problems.

...makes value judgements pertaining to possible solutions of selected technological problems.

...identifies the contributions of a selected industry to the growth of civilization.

II. SELF EXPLORATION

A. GENERAL OBJECTIVE: The student develops leadership and followership abilities.

Observable Behaviors

The student--

...exercises authority.

...leads a seminar.

...leads a construction subgroup.

...directs the design of the group project.

...leads a sales team.

...assumes one or more managerial roles.

...interacts with peers involved in other management roles.

...leads and directs the activities of others.

...assumes responsibilities for people and activities.

...assists peers in the solution of problems.

...contributes ideas and suggestions in group situations.

...makes decisions related to the solution of selected problems.

...participates in class discussion.

...interprets his/her role to class members.

...leads by chairing a committee.

B. GENERAL OBJECTIVE: The student develops his/her resourcefulness.

Observable Behaviors

The student--

...identifies various research facilities.

...uses card catalog properly.

...seeks assistance from experts.

...visits industry to gather information.

...plans and organizes an approach to collecting information.

...uses communication media effectively in seeking information.

...organizes information into useful patterns.

...organizes information under proper headings.

...develops an appropriate bibliography.

...uses cross-references in research topic.

...defines his position in the student company based on his/her counterpart in industry.

...operates audio-visual media.

...interacts with peers in the solution of problems.

...conducts independent research.

C. GENERAL OBJECTIVE: The student develops a positive self concept.

Observable Behaviors

The student--

...plans and designs a group project.

...constructs a group project.

...conducts independent research.

...performs one or more managerial roles.

...leads a seminar.

...leads a discussion.

...interacts with peers in solving problems.

...assumes responsibilities for people and activities.

...assists peers in the solution of problems.

...makes decisions relative to the solution of selected problems.

...assumes leadership and followership roles.

...pursues topics of interest.

...engages in new and involved peer relationships.

...uses a variety of hand and power tools for production purposes.

...experiences the opportunity to set ones own goals.

...tests his/her abilities, strengths, weaknesses, interests, likes, and dislikes.

D. GENERAL OBJECTIVE: The student develops insight into the range of career opportunities available to him or her, and consistent with their individual qualities and capabilities.

Observable Behaviors

The student--

...performs one or more managerial roles.

...interviews individuals in industry and business.

...develops a functional personnel system.

...visits his/her counterpart in industry regarding duties, education, responsibilities, promotions, salaries, and benefits.

...performs role of worker.

...works with tools and equipment in the production of a group project.

...works with the materials and media of contemporary society.

...visits industries.

...inquires into the production processes of a selected industry.

...listens to guest speakers.

...evaluates the work of class members.

...interprets role to class members.

...uses an organizational chart effectively.

...gathers information relative to the available career opportunities of a selected industry.

...interacts with peers involved in other management roles.

...uses audio-visual media to explore career opportunities.

...relates to class the responsibilities, training, hazards, salary and other such information about his/her counterpart in industry.

III. INTELLECTUAL GROWTH

A. GENERAL OBJECTIVE: The student develops his/her capabilities for exploring new situations.

Observable Behaviors

The student--

...performs one or more management roles.

...assumes responsibilities for people and activities.

...inquires into the solutions of selected problems.

...participates as a part of a group in decision-making, sharing of information, helping others, challenging, and evaluating.

...engages in new and involved peer relations.

...pursues a topic of interest.

...uses community as a resource in solving selected problems.

...enters into host of new and different social situations and varied forms of societal involvement.

...designs and constructs a group project.

...leads and directs the activities of others.

...explores a range of possibilities.

...applies previous learning to new situations.

...volunteers for a position.

IV. SKILL DEVELOPMENT

A. GENERAL OBJECTIVE: The student develops capabilities in the proper use of tools and machines.

Observable Behaviors

The student--

...uses tools, machines, and materials properly and economically.

...practices safe, neat work habits.

...constructs a group project.

...identifies products of quality workmanship.

...makes appropriate adjustments in tools and machines used.

...relates to teacher demonstrations.

...performs maintenance operations.

...selects proper tools and machines for operations to be performed.

...makes necessary calculations involved in machine processes.

...measures accurately.

...applies finishes to products.

...cuts, shapes, forms, and fastens materials.

...interprets working drawings and blueprints.

B. GENERAL OBJECTIVE: The student develops desirable social relationships.

Observable Behaviors

The student--

...offers constructive suggestions.

...performs one or more managerial roles.

...practices good democratic procedures.

...assists other students and accepts their assistance in class activities.

...works well with others.

...contributes ideas and suggestions in group situations.

...recognizes the contributions made by other students.

...practices good leadership.

...interacts with peers in management-labor relations activities.

...works cooperatively with others in designing and constructing a group project.

...leads and directs activities of others.

...enters into new and different social situations.

C. GENERAL OBJECTIVE: The student develops language and communication skills.

Observable Behaviors

The student--

...leads and participates in a seminar.

...leads and participates in group discussions.

...interprets his/her role to class members.

...interviews experts in business and industry.

...uses communication media effectively in searching for information.

...illustrates ideas and concepts effectively using drafting and design techniques.

...develops and uses audio-visual media to communicate with peers.

...designs, posts, and displays visual media.

...performs one or more managerial roles.

...designs and constructs a group project.

...participates as a part of a group in decision making, sharing of information, helping others, challenging and evaluating.

...follows good public speaking techniques in his presentations to the class.

...prepares an oral seminar report or presentation.

D. GENERAL OBJECTIVE: The student develops problem-solving skills.

Observable Behaviors

The student--

...plans and designs a group project.

...constructs a group project.

...performs one or more management roles.

...interacts with peers in solving problems.

...assumes responsibilities for people and activities.

...inquires into the solution of selected problems.

...assists class members in the solution of problems.

...makes decisions related to specific problems.

...uses effective problem-solving procedures in designing and constructing the group project.

...hires and fires laborers or managers depending on his/her position in the company.

V. INTERPRETING THE CHANGING NATURE OF INDUSTRY AND TECHNOLOGY

A. GENERAL OBJECTIVE: The student develops an understanding of the nature and role of industry and technology in the culture.

Observable Behaviors

The student--

...solves problems related to production, people, materials, etc.

...inquires into the role of industry and technology in a culture.

...studies benefits and problems of a selected industry.

...interviews experts in industry.

...conducts independent research.

...constructs a group project which depicts the nature and role of industry.

...makes value judgements pertaining to the role of industry and technology in a culture.

...searches current literature for information concerning the changing nature of industry and technology.

...identifies the contributions of a selected industry to the growth of civilization.

...chooses a project relevant to present and/or future technology.

B. GENERAL OBJECTIVE: The student develops understandings relative to technological innovation such as the need for it, factors contributing to it and its deterrents.

Observable Behaviors

The student--

...solves problems related to production, people, materials, etc.

...identifies technical innovations relative to the selected industry.

...inquires into possible effects of technological innovations upon society.

...listens to guest speakers.

...interviews experts in business and industry.

...conducts independent research.

...explores solutions to selected problems which result from technological innovation.

...participates in educational program.

...makes value judgements pertaining to the effects of technological innovations upon society.

...designs and constructs a group project.

...assumes responsibilities for people and activities.

...interacts with peers to determine the needs, contributions, and effects of technological innovation.

LINE PRODUCTION

I. UNDERSTANDING THE NATURE OF INDUSTRY AND TECHNOLOGY

A. GENERAL OBJECTIVE: The student develops understandings relative to the organization of contemporary volume-producing industry.

Observable Behaviors

The student--

...constructs line and staff organization charts.

...compares different forms of personnel or production organization charts.

...uses an organization chart in directing a line-production experience.

...describes the organization (personnel, financial, production, etc.) of a contemporary industry.

...applies the principles of good organization in his/her class role.

...develops a photographic display of the student personnel organization.

...buys and sells stock in a student company.

...in managerial positions hires and fires laborers as well as managers when needed.

...selects a board of directors for the student company.

...trains laborers or has laborers trained by qualified persons.

...sets up a union organization for the company.

...discusses roles necessary to run a company.

...visits industries and observes their organization.

...engages speakers to explain different phases of organization.

...advances in the company when positions are vacated.

...solves problems related to the management of the student company.

B. GENERAL OBJECTIVE: The student develops a knowledge of the products and processes of industry and technology.

Observable Behaviors

The student--

...classifies products into groups. (raw, finished, semifinished, etc.)

...constructs a prototype from raw materials.

...buys finished and semifinished parts for use in the line-production.

...compares his product with a commercial product assessing its marketability.

...determines quantity of product which is needed.

...develops a product idea from suggestions of classmates.

...presents slides depicting different product categories.

...suggests ideas for product to be produced.

...brings in examples of mass produced items.

...differentiates between single operation, multiple operation, mechanization, and automation processes in industry.

...views movies about line-production in a major industry.

C. GENERAL OBJECTIVE: The student explores the processes of volume-producing industries.

Observable Behaviors

The student--

...categorizes the different processes used in the line-production.

...researches a process utilized in line-production.

...goes on field trips, engages speakers and schedules movies showing various industrial processes that are relevant to line-production.

...designs or aids in designing the product to be produced.

...sets up, prepares or constructs machinery needed for line-production.

...develops a flow chart showing the various processes necessary along the line.

...makes a pilot run to see that all jigs and fixtures, machines, parts, subassemblies and assemblies fit or work properly.

...practices safe and neat work habits as set down by the safety and maintenance engineers.

...buys and sells stock in student company.

...arranges the equipment for economic flow of parts, subassemblies and assemblies.

...draws conclusions with regard to aspects of pilot and final run.

...tests and compares various materials for use in production.

D. GENERAL OBJECTIVE: The student develops a knowledge of the nature, utilization and significance of industrial materials.

Observable Behaviors

The student--

...selects and uses appropriate materials in production.

...identifies a variety of industrial materials.

...selects and uses a variety of materials.

...buys raw and finished materials as needed for line-production.

...compares prices on materials before buying.

...keeps records on materials ordered, and received as well as the amount of waste generated through production process.

...conducts a product need survey.

E. GENERAL OBJECTIVE: The student develops an awareness of the problems and benefits resulting from the technological and industrial nature of society.

Observable Behaviors

The student--

...experiences under production and over production in the line-production.

...organizes a union.

...deals with a surplus and the loss of profits from low sales.

...identifies environmental concerns resulting from the production process.

...serves on a safety committee.

...discusses safety programs in industry.

...negotiates conditions of employment in the company.

...participates in a mock strike.

...reports technological developments and their contribution to society.

...shares outside readings with class that relate to advances or declines in civilization as a result of mass production.

...evaluates technological advancement and the growth of civilization.

...analyzes the effects of "interchangeable parts" concept on quality manufacturing.

II. SELF EXPLORATION

A. GENERAL OBJECTIVE: The student develops a feeling that he has a contribution to make.

Observable Behaviors

The student--

...buys shares of stock in his/her company.

...defends an idea for product or production change.

...plays various roles in the company; i.e., line worker, supervisor, manager, etc.

...repeats an effort voluntarily.

...assumes management responsibility.

...assumes laborer responsibility.

...volunteers for a position.

...works cooperatively with others in the student company.

...assists other students in their research and construction.

...identifies with the class on organization producing the product.

...selects a name for the student company.

...sets the price and sells the product.

...reports to the class his/her selected counterpart's role in industry.

...suggests methods for lining-up the machines for the production-line.

...brainstorms ideas for a product.

...secures employment in the student company.

B. GENERAL OBJECTIVE: The student develops decision making skills through an emerging knowledge of occupations.

Observable Behaviors

The student--

...makes currency transactions.

...orders supplies needed for the line-production.

...bargains with union representatives.

...volunteers for a company position.

...trains others or is trained by others.

...distributes products to buyers.

...designs the product with the help of consultants from the company.

...reports and records the financial transactions of the company.

...generates and publishes information telling the public about the nature of the student industry.

...carries out a management role in the company.

...conducts a sales campaign.

...carries out his job responsibility.

...elects officers, board of directors, and appoints laborers.

...writes specifications for quality control of product to be produced.

C. GENERAL OBJECTIVE: The student develops resourcefulness, interest and aspirations.

Observable Behaviors

The student--

...finds information on his/her own in libraries and other sources.

...contacts and interviews persons in industry.

...learns to operate tools and machines.

...moves up the hierarchy of jobs and positions within the company.

...writes letters seeking information on a topic.

...selects an appropriate facility for running a production line.

...sells a product.

...sells stock in the company.

...pays and sets wages for the student company.

...activates safety regulations for the company.

...produces a production flow chart and material flow chart.

...advertises a product.

...makes a video tape presentation.

III. INTELLECTUAL GROWTH

A. GENERAL OBJECTIVE: The student develops a knowledge of research procedures in expanding capabilities for exploring new situations.

Observable Behaviors

The student--

...interviews company officials.

...investigates library resources.

...consults with other teachers in the school.

...consults with persons not associated with the school.

...reviews trade and industrial journals.

...secures industrial literature.

...secures an example of a production flow chart from industry.

...classifies information under appropriate headings.

B. GENERAL OBJECTIVE: The student develops a stimulating interest in the learning process.

Observable Behaviors

The student--

...identifies a product to be produced.

...participates actively in seminars.

...seeks help from others.

...applies math, science, English, and other subjects to find answers to questions.

...shares ideas with others.

...uses a wide range of reading materials.

...evaluates outcomes and process of the line-production activity.

...secures a guest speaker, movie, slides, artifacts.

...uses the mass media.

...interprets his role to other students.

...establishes goals for each aspect of the production process.

...conducts a seminar.

IV. SKILL DEVELOPMENT

A. GENERAL OBJECTIVE: The student develops construction skills related to hand and machine tool operation.

Observable Behaviors

The student--

...conducts himself/herself in a safe and efficient manner.

...constructs jigs and fixtures.

...prints stock certificates.

...sets up the production line.

...constructs a product or a portion of a product while involved in the production line.

...uses power and hand tools in the proper and safe manner.

...demonstrates new skills while working on the production line.

...selects the proper tool or machine for the job.

...exercises good control in using tools and machines.

...makes appropriate adjustments on tools and machines to ensure their proper functioning.

...utilizes guides, jigs, and fixtures to control operations on the production line.

...improves existing skill while working on the line.

...tests various products.

B. GENERAL OBJECTIVE: The student develops non-construction skills involving motor-mental proficiencies.

Observable Behaviors

The student--

...interacts with his fellow students in or out of class.

...interviews various officers in local companies.

...attends seminars held in industry and asks questions.

...makes presentations on various aspects of a product using audio-visual, and tactile stimuli.

...carries on conversations with the instructor, not as a teacher, but as a fellow businessman or a consultant.

...practices good democratic procedures.

...maintains records for continuity and evaluation.

...formulates a time table for production.

...increases his vocabulary and techniques for dispatching and compiling knowledge and information.

...submits a news article or advertisement to the local newspaper, PTA newsletter, or school newspaper.

...uses the telephone for communication with others.

...issues and maintains forms and documents to be used by the student company.

...publishes a report to stockholders.

...packages a product.

C. GENERAL OBJECTIVE: The student develops skills relating personal-social life.

Observable Behaviors

The student--

...bosses one or more students on the production line.

...takes orders while working on the line and carries them out.

...suggests a product and has plans to back the suggestion up.

...accepts constructive criticism about his plan and changes plan where the group deems necessary.

...heads up a design group.

...leads a safety seminar.

...brings in materials which will help others understand the line-production.

...relates to the class the responsibilities his position carries in the line-production.

...relates to the class the training needed to become his counterpart in industry.

...relates to the class the hazards encountered by his counterpart role in industry.

...relates to the class the salary his counterpart might receive.

...studies in a group.

D. GENERAL OBJECTIVE: The student develops exploratory and problem-solving abilities leading to learning how to learn.

Observable Behaviors

The student--

...redesigns a system for moving products from one point to another.

...utilizes the library to find research on fabricating methods.

...figures out how many board feet of wood will be required for the project.

...constructs charts and graphs establishing a production schedule for the project.

...carries out a pilot run.

...considers alternatives in plans, processes, materials, personnel, etc.

...faces problems with line flow.

...uses the vertical file in the library.

...solves problems applying geometry, electronics, power, or wood science, etc.

...tests materials and finishes for use on the line-production project.

...analyzes the flow of materials.

...analyzes the efficiency of the workers and the production line.

...determines the number of workers needed per station on the production line.

V. INTERPRETING THE CHANGING NATURE OF INDUSTRY AND TECHNOLOGY

A. GENERAL OBJECTIVE: The student develops insight into the significance of the growth and development of civilization.

Observable Behaviors

The student--

...relates past industrial spending to present industrial spending.

...compares present research and development budget with past research and development budget.

...compares past and present corporate structures and their effects on civilization.

...recognizes a change from a society stratified by wealth, reading ability, and priviledge to a society with no fixed class structure.

...traces the technical developments related to travel, communication and medicine.

...observes how industrialization has provided an extension of the favorable balance among resources, productivity, and population.

...states factors which have contributed to innovation.

...acknowledges factors leading up to mass production and line-production in society.

...discusses and describes the financial procedures and structures used in the development and growth of an industry.

B. GENERAL OBJECTIVE: The student develops an understanding of the role of technology in solving man's problems.

Observable Behaviors

The student--

...relates technological advancement to changes in food production, water purification, power generation, transportation, communication, pollution, education, health and safety.

...discusses the effects of technology on education.

...investigates the effects of technology on the community.

...observes the changes brought upon society by our changing technology.

...identifies the changes in government brought about by technology.

...identifies the role of man in our technological society.

...identifies the responsibilities of man in a technological society.

...relates working and living conditions to technological advancements.

...discusses the impact of excellerated technological advancement on man.

...identifies aspects of industry which have benefited food production.

...relates automation and cybernetics to changes in means of production.

C. GENERAL OBJECTIVE: The student develops an understanding of the influence of technological developments on society.

Observable Behaviors

The student--

...discusses manpower supply and demand.

...weighs the benefits of automation.

...argues a position on governmental controls.

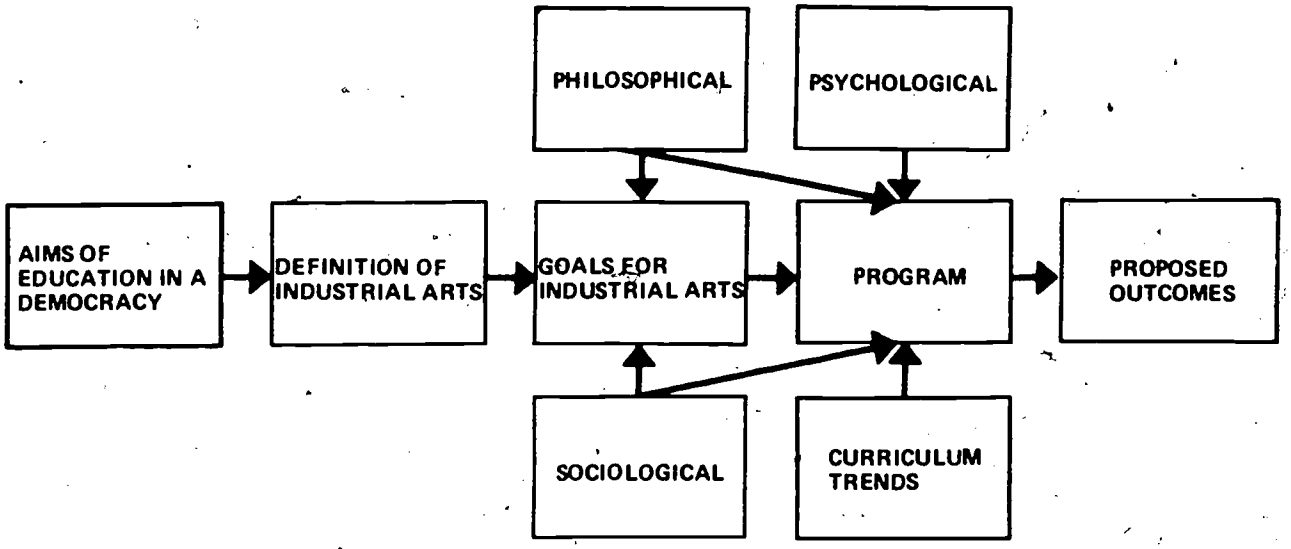
...detects pollution, waste, or unnecessary damage done to the environment as a result of modern technology.

...evaluates the changes in man as a result of changing technology.

APPENDIX

APPENDIX A

MARYLAND PLAN DEVELOPMENT MODEL



The above model represents the systematic way by which vital aspects of education and what is known about children were brought into the development of the "Maryland Plan" for the junior high. The diagram also places in perspective the process by which the program was developed as well as the importance of the outcomes to the program.

APPENDIX B

RESOURCE MATERIALS ON THE MARYLAND PLAN

Available on request at:
Department of Industrial Education
University of Maryland
College Park, Maryland

Maley, Donald

"Research and Experimentation in Industrial Arts in the Junior High School"

"Research and Experimentation in the Junior High School"

"Bases for Organizing the Content of Industrial Arts With Emphasis on the Research and Experimentation Programs"

"The Junior High School Program in Industrial Arts--A Study of Industry and Technology for Contemporary Man"

"The Developmental Tasks of Youth--An Important Factor in Program Development for Industrial Arts"

"Student Development an Essential Base for Program Development"

"The Unit Approach: The Anthropological Unit Approach as an Industrial Arts Program for the Seventh Grade"

"The Seminar"

Gettle, Karl

"Bibliography for the Anthropological Approach"

"The Maryland Plan: All You Wanted to Know About the Anthropological Unit Approach"

Day, Gerald

"A Resource Guide for the Maryland Plan's Group Project and Line Production"

Smith, Harley

"The Maryland Plan: Industrial Arts Program for the Junior High"

APPENDIX C

FILMS ON THE MARYLAND PLAN FOR INDUSTRIAL ARTS

Available on request at:

Department of Industrial Education
University of Maryland
College Park, Maryland

A. Research and Experimentation. 16 mm. B. & W. Optical Sound, 25 min.

B. The Seminar. 16 mm. B. & W. Optical Sound, 27 min.

C. Conversations on Industrial Arts. 16 mm. B. & W. Optical Sound, 33 min.

D. The Group Project. 16 mm. Color. Optical Sound. 30 min.

E. Tomorrow Begins Yesterday. 16 mm. Color, Optical Sound. 28.5 min.

F. Gift of the Future. 16 mm. Color. Optical Sound. 28.5 min.